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TITLE: AVALANCHE PHOTODIODE

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ABSTRACT:

PURPOSE: To form a low-noise, high-speed and high-sensitivity avalanche photodiode (APD) by a method wherein an InP and InGaAs doping superlattice of graded energy-band structure is used as an electric-field limiting layer.

CONSTITUTION: A buffer layer 2, a light-absorbing layer 3, an InP and InGaAs superlattice 5, an N- InP layer 6 are grown in succession on a substrate 1. Then, after Cd has been diffused at a low temperature and a guard ring 7 has been formed, a main unction 8 is formed by selective thermal diffusion of Zn. A passivating film 9 is a three-layer structure of PSG/SiO2/SiN; an antireflection film 10 is composed of SiN. Lastly, a P-type ohmic electrode 11 and an N-type ohmic electrode 12 are formed. A carrier generated in the light-absorbing layer 7 passes through an electric-field limiting layer, is avalanche-multiplied inside a carrier-multiplying layer and reaches a P-N junction. Because an InP and InGaAs superlattice is used as the carrier-multiplying layer, the ratio of an ionization factor for an electron and a hole becomes big and the S/N ratio is improved.